

CLAIMS LISTING

1.-26. (canceled)

27. (original) A method for delivering fluid to an ocular region during a phacoemulsification procedure, comprising:

irrigating the ocular region by applying a series of modulated fluid pulses to the ocular region via a fluid control device.

28. (original) The method of claim 27, wherein irrigating comprises delivering pulses of fluid for a series of pulses having duration less than 100 milliseconds.

29. (original) The method of claim 28, wherein said fluid pulses are interspersed by brief de minimis fluid pulse periods.

30. (original) The method of claim 27, wherein fluid pulses are delivered using a phacoemulsification handpiece.

31. (original) The method of claim 27, further comprising delivering modulated ultrasonic energy to the ocular region simultaneous with said irrigating.

32. (original) The method of claim 31, wherein timing of modulated ultrasonic energy delivery corresponds to timing of the series of modulated fluid pulses.

33. (original) The method of claim 31, wherein timing of modulated ultrasonic energy delivery differs from timing of the series of modulated fluid pulses.

34. (original) The method of claim 31, wherein application of modulated ultrasonic energy delivery tends to induce transient cavitation in the ocular region.

35. (original) The method of claim 27, wherein each fluid pulse is at most approximately 25 milliseconds.

36. (original) The method of claim 27, wherein each fluid pulse is at most approximately eight milliseconds.

37. (original) A method of delivering fluid to a region during a tissue removal procedure, comprising:

delivering modulated fluid pulses during an on period, fluid pulse delivery comprising:

delivering at least one pulse of fluid having a relatively high amplitude; and

delivering a de minimis quantity of fluid after delivering every high amplitude fluid pulse.

38. (original) The method of claim 37, further comprising delivering modulated ultrasonic energy during multiple ultrasonic energy on periods interspersed by multiple de minimis ultrasonic energy application periods.

39. (original) The method of claim 38, wherein the tissue removal procedure occurs within a tissue removal environment, and wherein delivering modulated ultrasonic energy tends to induce transient cavitation within the tissue removal environment.

40. (original) The method of claim 37, wherein delivery of at least one pulse of fluid having the relatively high amplitude occurs for less than approximately 25 milliseconds.

41. (original) The method of claim 37, wherein delivery of at least one pulse of fluid having the relatively high amplitude occurs for less than approximately 10 milliseconds.

42. (original) The method of claim 37, wherein delivery of at least one pulse of fluid having the relatively high amplitude occurs for less than approximately 5 milliseconds.

43. (original) The method of claim 37, wherein delivery of at least one pulse of fluid having the relatively high amplitude occurs for less than approximately 2 milliseconds.

44-51. (canceled)

52. (original) A method for providing modulated fluid pulses to an ocular region during a phacoemulsification procedure, the method comprising:

applying fluid to the ocular region using at least one modulated fluid pulse period, wherein each modulated fluid pulse period comprises:

applying fluid to the ocular region using a fluid pulse for a first period of time;
and

applying de minimis fluid to the ocular region for a second period of time.

53. (original) The method of claim 52, wherein time between said applying fluid and applying de minimis fluid is essentially zero.

54. (original) The method of claim 52, further comprising applying modulated energy to the ocular region concurrent while applying fluid to the ocular region using at least one modulated fluid pulse period, wherein applying modulated energy tends to induce transient cavitation within the ocular region environment.

55. (original) The method of claim 54, wherein applying modulated energy occurs at a frequency differing from a frequency whereby fluid is delivered to the ocular region.

56. (original) The method of claim 54, wherein applying modulated energy occurs at a frequency related to a frequency whereby fluid is delivered to the ocular region.

57. (original) The method of claim 52, further comprising applying third fluid at a third fluid time subsequent to the second fluid time.

58. (original) The method of claim 57, wherein amplitude of the third fluid is substantially identical to amplitude of the fluid.

59. (original) The method of claim 57, wherein amplitude of the third fluid materially differs from amplitude of the fluid.

60. (original) The method of claim 52, wherein each fluid pulse has duration less than approximately 20 milliseconds.

61. (original) The method of claim 52, wherein each fluid pulse has duration less than approximately 2 milliseconds.

62. (original) A method for providing fluid during a surgical procedure, comprising:

providing fluid using a fluid control device during a plurality of pulse periods, said pulse periods comprising a fluid surge period followed by a fluid pause period, wherein fluid applied during the fluid surge period is greater than fluid applied during the fluid pause period.

63. (original) The method of claim 62, wherein fluid is applied in conjunction with application of modulated ultrasonic energy.

64. (original) The method of claim 62, wherein the fluid surge period duration is at most approximately twenty milliseconds.

65. (original) The method of claim 62, wherein the fluid surge period duration is at most approximately two milliseconds.

66-76 (canceled)

77. (original) A method for aspirating fluid from an ocular region during a phacoemulsification procedure, comprising:

aspirating the ocular region by applying a series of modulated differential pressure pulses to the ocular region via a fluid control device.

78. (original) The method of claim 77, wherein aspirating comprises delivering a series of pulses having a negative pressure differential from ambient for duration less than 100 milliseconds.

79. (original) The method of claim 78, wherein said negative pressure differential pulses are interspersed by brief de minimis pressure differential pulse periods.

80. (original) The method of claim 77, wherein negative pressure differential pulses are delivered using a phacoemulsification handpiece.

81. (original) The method of claim 77, further comprising delivering modulated ultrasonic energy to the ocular region simultaneous with said aspirating.

82. (original) The method of claim 81, wherein timing of modulated ultrasonic energy delivery corresponds to timing of the series of modulated pressure differential pulses.

83. (original) The method of claim 81, wherein timing of modulated ultrasonic energy delivery differs from timing of the series of modulated pressure differential pulses.

84. (original) The method of claim 81, wherein application of modulated ultrasonic energy delivery tends to induce transient cavitation in the ocular region.

85. (original) The method of claim 77, wherein each pressure differential pulse is at most approximately 25 milliseconds.

86. (original) The method of claim 77, wherein each pressure differential pulse is at most approximately eight milliseconds.

87. (new) A method for performing a surgical procedure, comprising:

providing pulsed ultrasonic energy to a surgical region, wherein said pulsed electronic energy comprises pulse characteristics selectable by an operator; and

providing fluid to the surgical region during at least one modulated fluid burst period, said modulated fluid burst period comprising a fluid pulse followed by a de minimis fluid pulse.

88. (new) The method of claim 87, wherein fluid is provided via fluid pulses having duration less than 100 milliseconds.

89. (new) The method of claim 87, wherein said pulsed ultrasonic energy is provided during at least one modulated energy delivery period.

90. (new) The method of claim 89, wherein said modulated energy delivery period operates in conjunction with the modulated fluid burst period to enhance effects of a surgical procedure.

91. (new) The method of claim 90, wherein enhancing effects of the surgical procedure comprises improving acquisition and removal of tissue during the surgical procedure.

92. (new) The method of claim 89, wherein enhancing effects of the surgical procedure comprises enhancing effects from cavitation forces encountered during the surgical procedure.

93. (new) The method of claim 87, wherein said fluid providing further comprises providing a subsequent nonzero amplitude fluid pulse.

94. (new) The method of claim 93, wherein amplitude of said subsequent nonzero amplitude fluid pulse materially differs from amplitude of said fluid pulse.

95. (new) The method of claim 93, wherein amplitude of said subsequent nonzero amplitude pulse is substantially identical to amplitude of said fluid pulse.

96. (new) The method of claim 93, wherein each fluid pulse has a duration of at most approximately 25 milliseconds.

97. (new) The method of claim 93, wherein the fluid pulse produced by the irrigation means has a duration of at most approximately 8 milliseconds.

98. (new) A method for performing a surgical procedure, comprising:

providing pulsed ultrasonic energy to a surgical region, wherein said pulsed electronic energy comprises pulse characteristics selectable by an operator; and

providing fluid to the surgical region by applying fluid for a fluid pulse period followed by applying de minimis fluid during a fluid pause period.

99. (new) The method of claim 98, wherein fluid is provided via fluid pulses having duration less than 100 milliseconds.

100. (new) The method of claim 98, wherein said pulsed ultrasonic energy is provided during at least one modulated energy delivery period.

101. (new) The method of claim 100, wherein said modulated energy delivery period operates in conjunction with the modulated fluid burst period to enhance effects of a surgical procedure.

102. (new) The method of claim 101, wherein enhancing effects of the surgical procedure comprises improving acquisition and removal of tissue during the surgical procedure.

103. (new) The method of claim 100, wherein enhancing effects of the surgical procedure comprises enhancing effects from cavitation forces encountered during the surgical procedure.

104. (new) The method of claim 98, wherein said fluid providing further comprises providing a subsequent nonzero amplitude fluid pulse.

105. (new) The method of claim 104, wherein amplitude of said subsequent nonzero amplitude fluid pulse materially differs from amplitude of said fluid pulse.

106. (new) The method of claim 104, wherein amplitude of said subsequent nonzero amplitude pulse is substantially identical to amplitude of said fluid pulse.

107. (new) The method of claim 104, wherein each fluid pulse has a duration of at most approximately 25 milliseconds.

108. (new) The method of claim 104, wherein the fluid pulse produced by the irrigation means has a duration of at most approximately 8 milliseconds.